OUR NAVY'S

Striking Power

CLOSE-UPS OF ITS LATEST EQUIPMENT

What is - a Pig Boat - a Chicago Piano - a Director - a Paravane - a Collision mat - a Magnetic mine - a Blinker ?

By Leonard G. Winans

Illustrated by Robert Sherry

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The eyes of the world are on the great juggernaut — the United States Navy. Is it equipped for the sea-air fighting of today? Has it modern gadgets to match any new tricks an enemy might spring?

Here are some of the answers: the magnetic mine defense, amphibian tanks, submarine net cutter, flash cones, paravanes, automatic gun aiming devices, and many other marvels of mechanical invention. Photographs of some of these have appeared in the public prints — some have not yet appeared in the papers — here we see them pictured in action, and drawn and described in illuminating, fascinating detail.

All of the material in this book was obtained with the cooperation of the Navy Department.

GROSSET & DUNLAP
Publishers NEW YORK

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CONTENTS

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THE STRIKING POWER OF OUR NAVY!

Unlike the Army or the Air Corps, our Navy is made up of hundreds of self-contained units. Each ship of the fleet must be an arsenal, a storehouse, a powerhouse and a barracks, all confined within a small space and sufficient unto itself.

These tightly knit units—battleships, heavy and light cruisers, destroyers, torpedo boats, aircraft carriers, submarines, mine sweepers, mine layers, transports, supply ships, repair ships and hospital ships—must, in turn, operate with other vessels in squadrons, flotillas or fleets. These are made up on the spur of the moment as circumstances require, regardless of weather, the distance from home ports or the condition of the ships themselves.

Behind the vessels of the fleet is a vast organization devoted entirely to its supply and maintenance—furnishing food, clothes, men, machinery, water, repairs, oil, china, typewriters, ammunition, medical supplies and a thousand and one special items in every corner of the world.

All these ships, all the machinery of supply and all the work of the entire Navy is devoted to just one thing — STRIKING POWER — and we shall show, in brief fashion, how it is achieved and the means by which this power is defended against enemies.

PATROL TORPEDO BOATS *(PT's)*

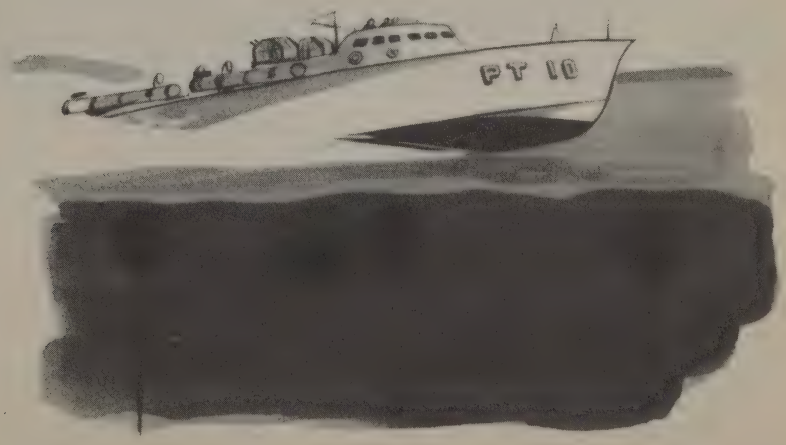
Capable of a speed of 50 miles per hour, and able to operate in all kinds of weather, these are the vipers of the fleet.

Each boat carries four torpedoes for offensive purposes against surface vessels, and four .50 caliber machine guns for use against aircraft. When a boat goes into action, the torpedo tubes are turned outward, and the boat is maneuvered so that the fired torpedo and the enemy vessel will reach the same point at the same time. The speed of these torpedoes is about 44 miles per hour.

The machine guns are mounted in pairs in bulletproof transparent turrets. These guns are extremely effective, and a half-dozen boats, with all the guns working, put up an excellent defense against enemy planes.

The patrol torpedo boat represents the most striking power, per ton, of anything afloat. Its small size, high speed, and great maneuverability make it an exceedingly difficult target that only the most expert gunners are able to hit. In addition, its shallow draft permits it to ride over most mine fields in safety.

An action, particularly at night, against a flotilla of these small boats is a hammer and tongs affair, and in difficult or narrow waters it would require a fleet of considerable size to render them ineffective.



TORPEDOES

These are the principal weapons of the destroyers, the submarines and the patrol torpedo boats.

Two main types are in use: one, 18 inches in diameter, is approximately 8 feet long and has a speed of 39 miles per hour and a range of 3 miles. The other is 21 inches in diameter, is approximately 10 feet long and has a speed of 45 miles per hour and a range of 5 miles.

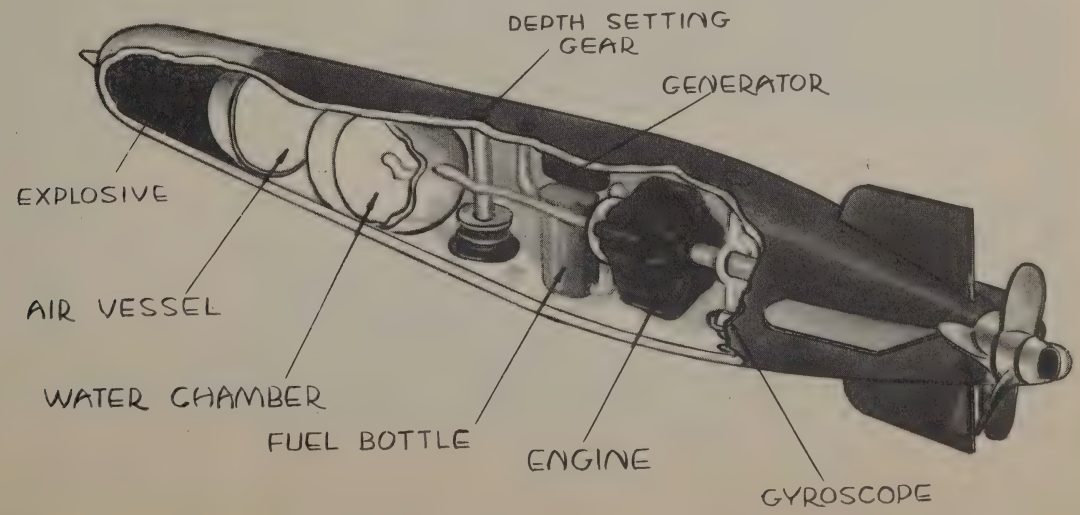
Both types are fired from the tubes either by compressed air or a small charge of powder. They travel in the air just far enough to clear the side of the ship, then drop into the water and proceed under their own power.

Some torpedoes run on compressed air, others are propelled by distillate (a light gasoline) and steam.

All types are fitted with gyroscopic controls which keep them dead on their courses at all times—one of these projectiles may strike a wave, leap in the air, come down sideways, and still return to its original course in a few seconds.

Both have a propeller in the nose, and a safety trigger on the hull which catches on a projection in the tube the minute the torpedo is fired. The rush of water turns the propeller, unscrewing it, until it falls off. This leaves the firing pin free to strike and set off the explosive charge. Thus with the propeller on the nose and the trigger up, the torpedo is a safe implement to handle.

A torpedo is made so that it will sink at the end of its run, in order to prevent its salvage by the enemy.



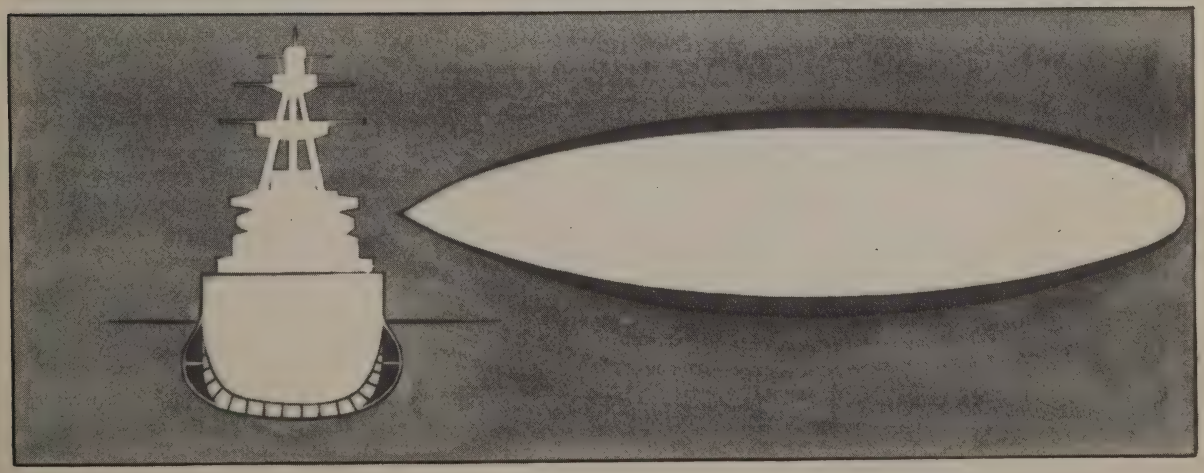
ARMOR

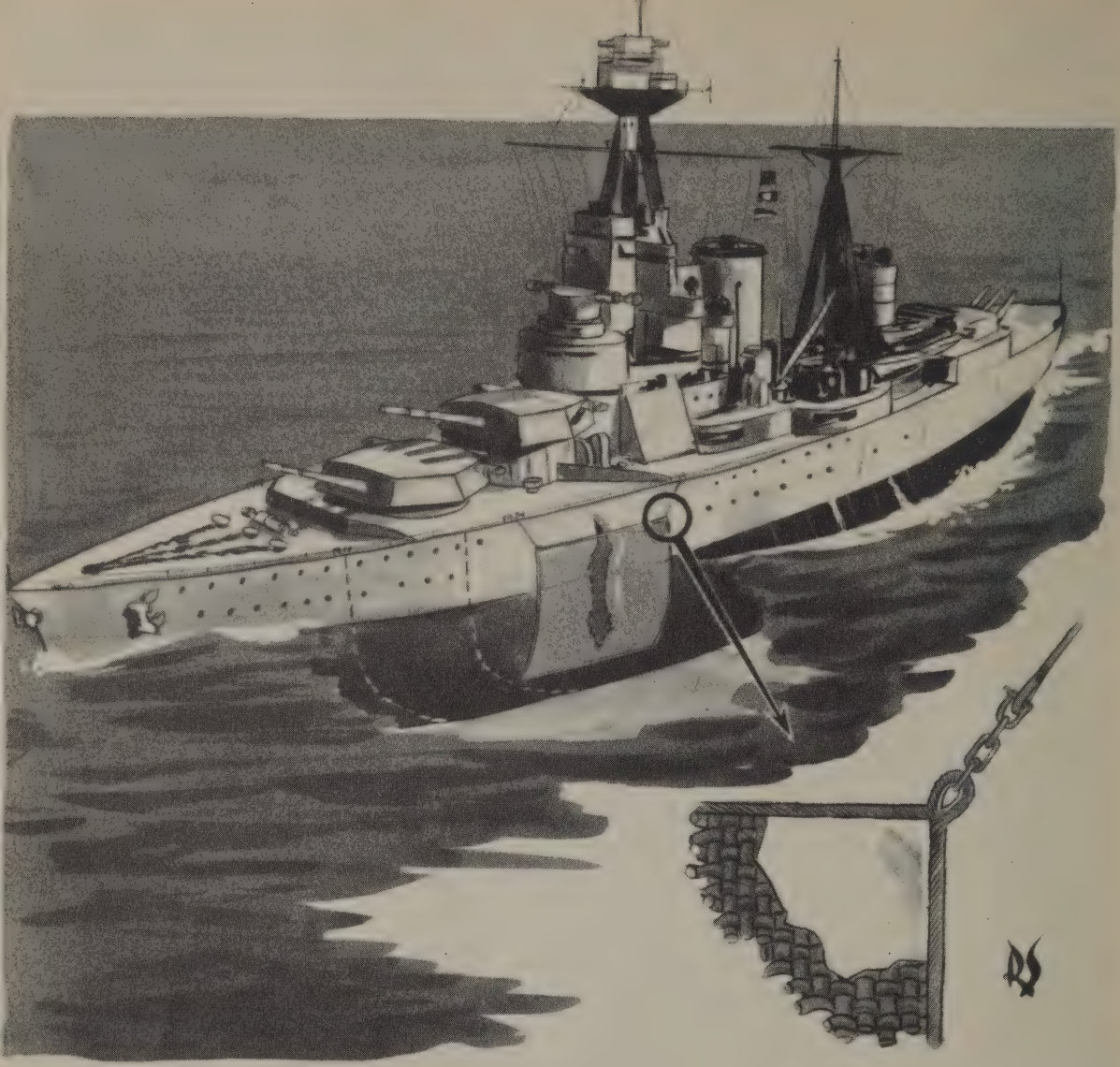
Modern men-of-war are able to withstand an immense amount of pounding for they are protected in vital spots against many types of weapons.

Heavy armor is required to withstand shells and bombs. The drawing opposite indicates the armor plate distribution on a battleship, showing plating along the water line, the turrets, the barbettes, conning tower, and on the sloping steel roof, to deflect bombs.

Protection against torpedoes is provided through the use of "bulges", or "blisters", along the hull. These really comprise a separate hull, beginning just at the water line, and swelling out considerably just below it, where a torpedo is most liable to strike. This extra hull is crisscrossed with partitions, forming small watertight compartments.

Since a torpedo explodes on contact and does not penetrate, it merely tears the outside hull and fills a few of the compartments with water, leaving the inside hull intact. The ship's balance is then restored by ballast tanks, and the vessel is free to go her way, a little slower but no less effective.





COLLISION MAT

This is an old-fashioned device just now coming back into use. Originally designed to plug holes caused by ramming—a practice long since discontinued—the collision mat is now used to repair temporarily the ravages of torpedo and bomb.

When a torpedo hits a ship in her "blisters" (see page 7) that portion of the hull is exposed to serious damage by another torpedo. On the other hand, the blister may not have afforded complete protection so that a leak has developed. In addition, a demolition bomb may burst below the water line and open a large leak in the hull. Plugging these holes is the function of the mat.

The collision mat itself is an immense square, made of heavy rope woven into a solid piece of fabric, covered on both sides with heavy canvas. The size of the mat varies with the size of the ship. Steel rings are set into its four corners and steel ropes are fastened to the rings.

Just as soon as the ship has been struck, the vessel stops. The mat is lowered to cover the leak, and the two ropes attached to the upper end are fastened to the deck. Then the ropes at the lower end of the mat are passed under the bow and carried along to a point directly opposite the mat. The upper ropes are tightened, thus rigging the mat directly over the hole. The pressure of the water then effectively jams the mat into the plating and plugs the gap.

Surprisingly enough, despite its cumbersome appearance, the mat is not too great an obstruction to a vessel's progress, and long voyages have been made at considerable speed with it in position.

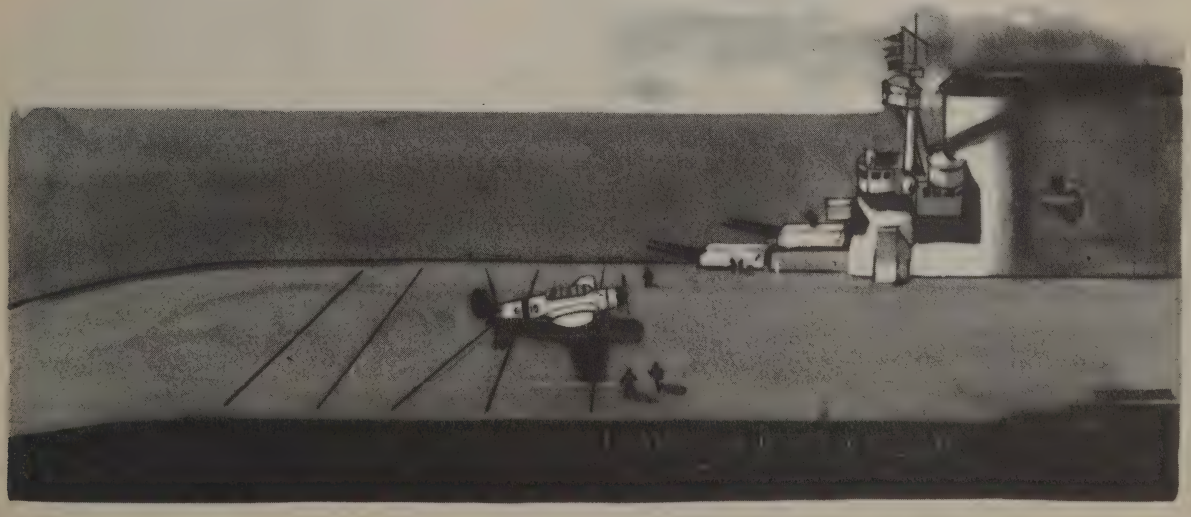
AIRCRAFT CARRIER

This floating flying field represents a mobile unit of great offensive and defensive power. In addition to the planes it carries, it is heavily armed with guns up to 8 inches, has a speed of 39 miles per hour, and a wide cruising range. Thus, it is able to defend itself against enemy vessels and bombs even though its own planes are away.

It carries from fifty to one hundred land planes which take off from the broad deck exactly as they would from a flying field. In landing, an ingenious device slows them down gradually, bringing them to a complete stop before they reach the far end of the deck. Since the ship may steam directly into the wind at will, the planes are able to get a maximum of lift in taking off, and a minimum of speed in landing.

The planes are fitted with flare and smoke bombs which ignite if a machine crashes in the water. In addition, the pilot can set fire to his plane in the air before jumping with his parachute, and in this way draw attention to his plight even though he may be many miles from his squadron or the carrier.

The carrier contains a complete workshop as well as fuel, ammunition and parts for the care and maintenance of its planes. It also carries equipment to salvage water-borne wrecked planes.



CATAPULT

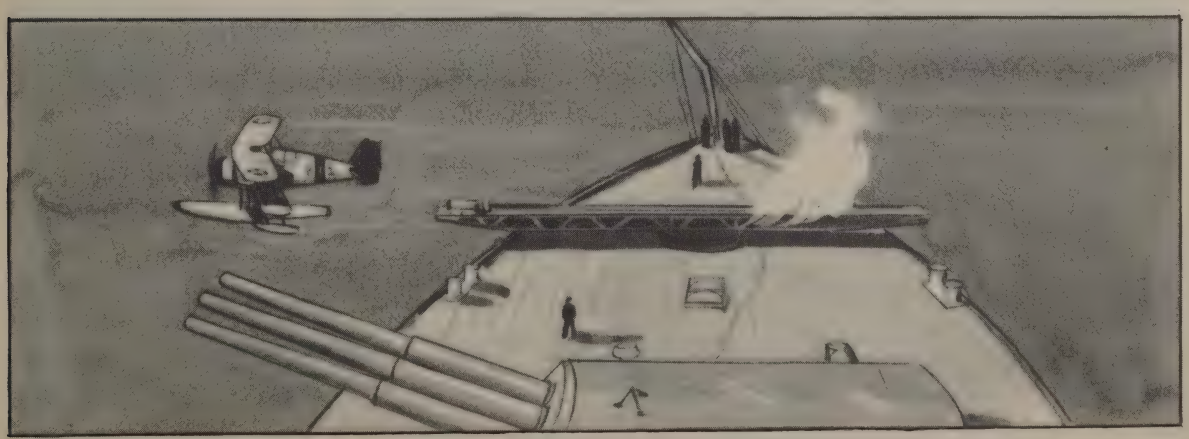
Each battleship and cruiser carries from one to five planes. These are used to search out the enemy, to report his maneuvers, and to advise the gunners as to the efficacy of their fire.

Unlike the planes used by the regular carriers, these are fitted with floats for landing on water.

Since the regular warships do not have broad decks, special devices must be used for take-offs and landings. The planes are shot from a catapult in taking off, and are hoisted in from the water by a large crane after having completed their mission.

The catapult consists of a pair of rails, suitably supported, which may be swung to point in any direction. A small trolley rides upon the rails, and the plane is secured to the trolley by a catch. When the plane is to be launched, the trolley is hauled to the back end of the rails and then fired by a small powder charge. This impulse gives the plane a forward speed, in addition to the pull of its motor, of about 70 miles per hour. When the trolley reaches the front end of the rails, the catch automatically releases the plane which proceeds on its way under its own power.

In returning, the pilot lands close to the ship, the crane is turned out, the pilot taxis under it, and the plane is hoisted in and replaced upon the trolley.



MULTIPLE ANTI-AIRCRAFT GUN *(Chicago Piano)*

This is the Navy's greatest protection against dive bombers. Several different types exist, from .50 caliber guns in twos, to .37-mm guns in groups of ten or more.

The "Chicago piano" pictured shows four .50 caliber machine guns operating as one unit, each gun firing about 150 shots per minute. The cartridges fit in belts rolled up in carriers which can be replaced very quickly by hand when the belts are empty.

One man sights and fires the guns. His right hand, with the trigger under his thumb, is on the wheel which moves the "piano" from side to side. His left hand works another wheel that elevates and depresses the barrels.

The hollow cones on the ends of the barrels prevent the flash of the guns being seen at night, which would indicate their position to the bombers.

These guns are effective up to an altitude of five thousand feet which is sufficient to take care of dive bombers after they have actually gone into their dives. However, since a dive bomber must make a straight dive on its target for a considerable distance before letting its bombs go, the gunners at the smaller weapons have a very good chance to bring the plane down.

The larger caliber guns do not use belts—the cartridges are fed into the gun from sloping trays. One man is kept busy putting ammunition into the upper end of the tray, while the cartridges automatically load into the gun from the lower end.

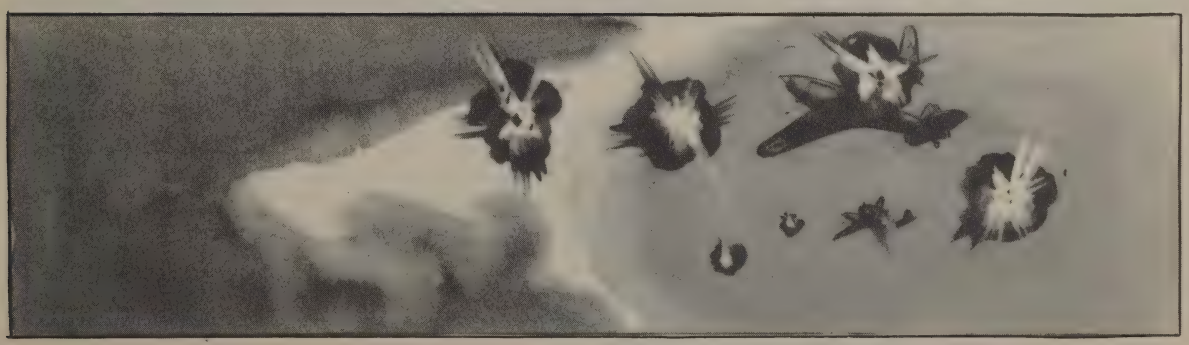
These larger guns reach into differing altitudes depending on their size, and are used to break up actual formations in flight and to force the large bombing planes into a high altitude, thus making accuracy difficult.

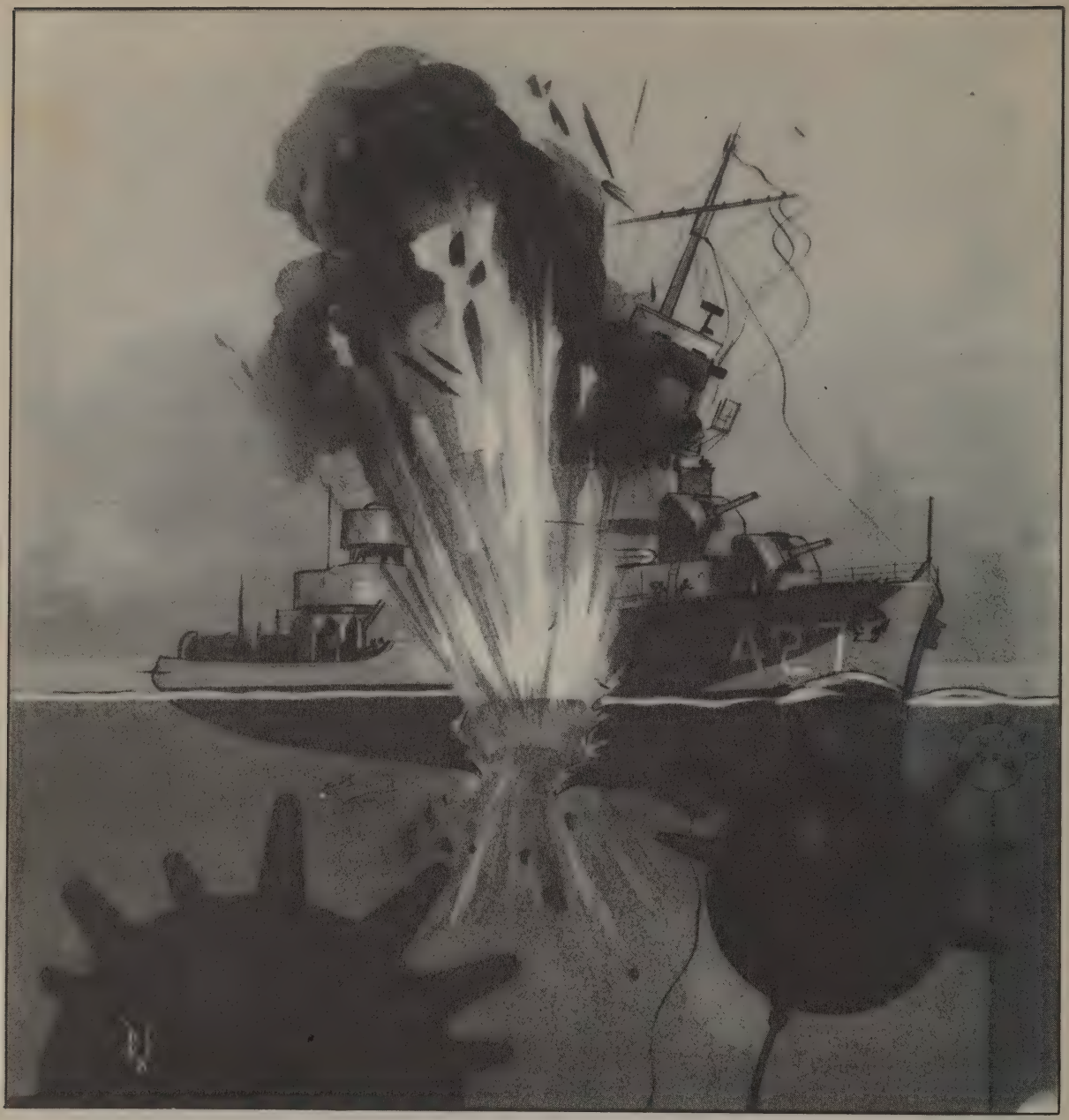
ANTI-AIRCRAFT GUN

This is a long-range weapon for defense against high-flying planes and bombers. Most of these are 4 inch and some are even larger.

Unlike the multiple guns, each shell is put in by hand. However, once the shell, fixed in its cartridge, is pushed in and the breech closed, the action becomes automatic. The gun fires, the breech reopens, and the spent cartridge case is ejected—mechanically. The rate of firing is determined by the speed with which the crew handle the shells.

The shells are fired in patterns and not necessarily directly at the planes. Twelve 4-inch shells per minute (from each of, say, four guns) bursting in groups form a difficult area for high bombers. They create whole fields of danger, breaking up flying formations, throwing bomb sights out of line, and generally causing confusion to the enemy.





MINES

There are three types of mines with which the Navy is principally concerned.

FLOATING MINE. This is a steel barrel-like container holding about 150 pounds of TNT. It is fitted with glass projections on sides and top. When one of these is broken the mine explodes.

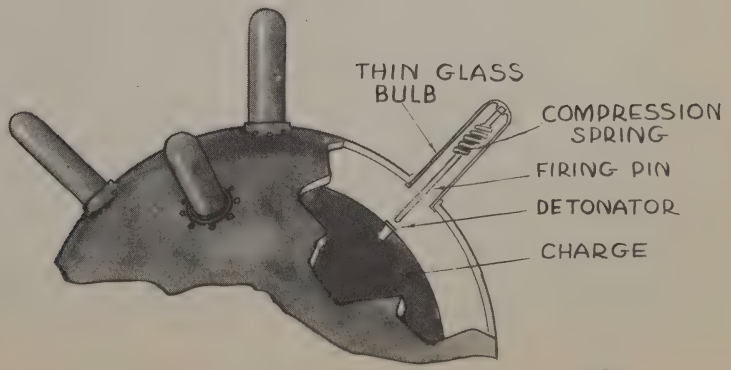
Floating mines are dropped for immediate protection against pursuing vessels. As their sphere of action cannot be controlled, if left in the water they might drift into the path of neutral or defenseless vessels. Thus, under International Law, they are designed to sink to the bottom twenty-four hours after sowing.

CONTACT MINE. This is a globular steel container which operates on the same principle as the floating mine, except that it has an anchor which keeps it in a fixed position. The length of the anchor cable may be adjusted so that the mine will lie at a predetermined depth. In this way, a mine field can be sowed so that small vessels may pass over it unharmed, thus reserving the mines for important ships only.

Contact mines are the most widely used as their cost is low, their operation quite simple, and their effect tremendous.

MAGNETIC MINE. This is of the same general type as the contact mine, except that it is fired by magnetic action instead of by contact. Any steel vessel passing within 150 feet of one is sufficient to swing the magnetic needle inside the mine, thus setting it off.

Magnetic mines are somewhat erratic, and are expensive, but their increased radius of action makes them valuable where conditions permit the laying of only a few mines at a time.



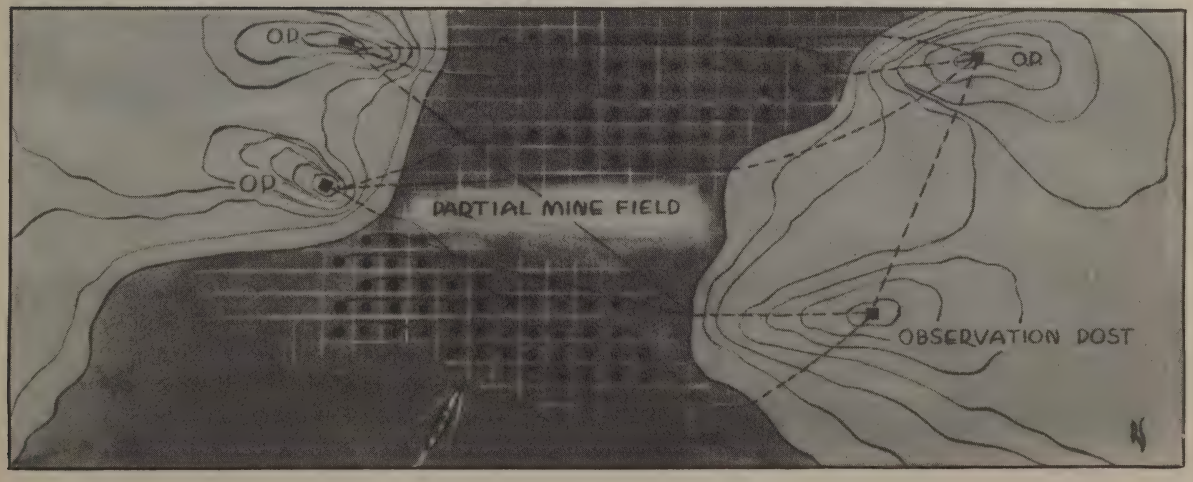
MOORED MINES

While the laying and maintenance of these is the work of the Coast Artillery of the U. S. Army, their operation is against naval vessels, and that is why they are included in this book.

A moored mine, similar to a contact mine, is a canister containing a large charge of TNT, but it can only be fired by an electrical impulse from the shore. Laid in checkerboard rows across harbor entrances, anchored to the bottom, each mine is connected by wires to observation posts on the shore.

Each observation post has a chart of the harbor, ruled off in numbered squares, mounted on a switchboard. When an enemy vessel enters, say, Square Number 26, the observer pulls Number 26 switch, and the mine in that square explodes, destroying the vessel. Each mine field is interconnected with several observation posts so that if one or more of the posts are destroyed by the enemy, the mine field may still be operated.

The great advantage of the moored mine lies in the fact that our own vessels are free to come and go. As the mines lie very close to the bottom, they are rarely disturbed by passing ships, and even if they were, would cause no damage since they could probably be opened with a hammer and chisel without ill effect.



SURFACE MINE LAYERS

These are medium-sized vessels, slightly larger than destroyers. They are fast, have considerable cruising range, and good carrying capacity.

Unlike mine laying submarines (page 31), no air lock is necessary at the stern: the mines roll to the rear on small trolleys whose tracks are above water level. The tracks bend down below the surface at the immediate stern, and the mines are released through a simple trap door.

These mine layers usually work at night, sowing their mines at enemy harbor entrances, ship channels, etc., and are over the horizon and out of sight by dawn. They also lay protective mine fields in their own territory, leaving twisting channels which are carefully marked on charts so that their own ships may come and go without harm.

When not engaged in laying mines, these ships are often used as escort and anti-aircraft vessels to protect mine sweepers, convoys and other auxiliary vessels.

MINE SWEEPERS

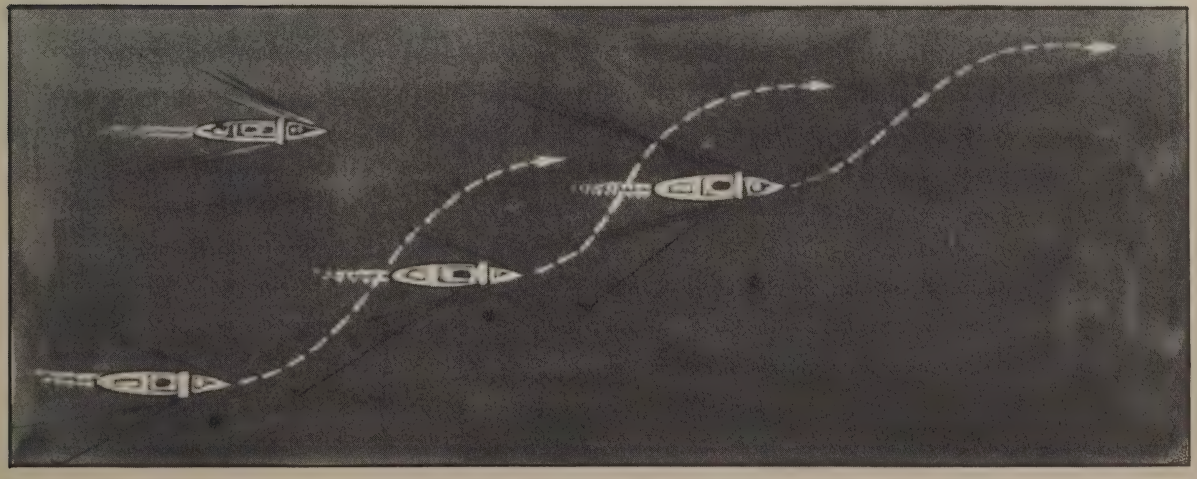
The boats used for this most hazardous job are, for the most part, small, stout, powerful steam vessels.

The mine sweeping equipment is simple, consisting of a large, square board made of heavy planking and a 300 foot length of steel wire rope. The board is known as the "kite" and the rope is the "sweep". One end of the rope is attached to the vessel and the other end is attached to the kite. On the kite end of the rope is a sharp steel saw which cuts the anchor cable of the mine.

As the ship steams slowly forward, the kite is lowered into the water and the rope paid out. The kite immediately gets a bite in the water and begins to travel outward, away from the vessel, in exactly the same manner in which a regular kite behaves in the air.

The kite, being well below the surface, drags the steel rope along at right angles to the hull, cutting mine cables as it goes. When the mines bob to the surface, they are exploded, or punctured and sunk by rifle fire.

The mine sweepers work in groups, generally defended by an anti-aircraft vessel, each traveling in the path swept by the ship ahead of it. Because the vessel taking the lead is obviously in the most dangerous position, each boat usually takes its turn leading the group.



PARAVANES

Warships and merchant vessels, entering waters believed to be mined, are equipped with this protective device. It consists of a steel framework, set over the bow, from which are appended two wires, one on each side. At the outside end of each of these wires is a buoy closely resembling a torpedo in shape, and fitted with a rudder which is always turned to keep the buoy headed away from the vessel.

Since both buoys are headed away from the ship, the wires are kept moderately taut forming a "V" of which the vessel is the apex. This keeps the mines from touching the hull and exploding, and occasionally sweeps up a few as well. Some of the paravane cables are fitted with small saws to help cut the mine moorings. Thus the paravane is a small edition of the mine sweep, which is too heavy and cumbersome to be used on a vessel traveling at any speed.

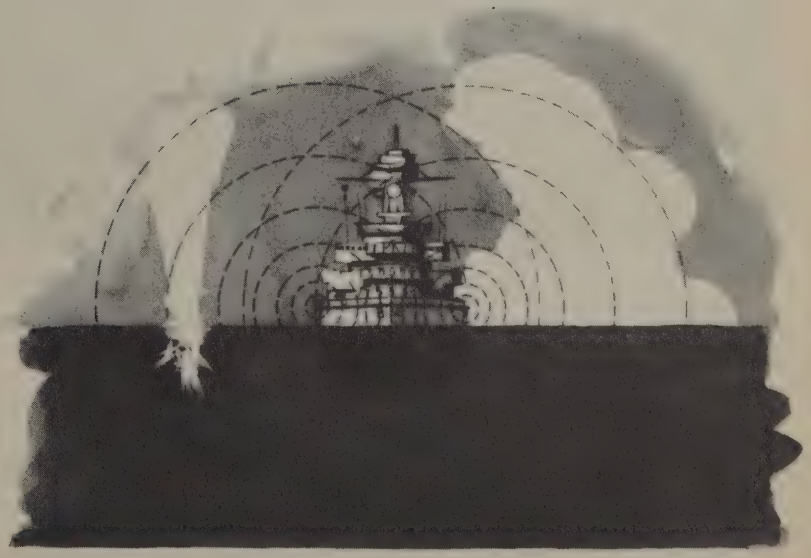
Unfortunately, nothing has yet been devised to sweep up mines encountered head-on, and it is from these that most casualties occur.

ANTI-MAGNETIC MINE DEVICE *(Degaussing Cables)*

Shortly after the magnetic mine came into use a device to counteract it was invented.

This device simply consists of a heavy electric cable which passes completely around the ship. This cable is kept charged with electricity during the entire time the vessel is at sea. A magnetic field is thus produced which extends away beyond the vessel on both sides, ahead and behind. Therefore the magnetic mine is exploded by this cable long before the ship reaches it, and the explosion is over when the vessel approaches the spot where the mine had been.

Some magnetic mines are fitted with a series of several triggers, all of which must be tripped before the mine will explode. This permits several vessels to pass over them unharmed, until one contacts the last trigger, setting off the blast. However, the degaussing cable is, of course, just as effective with this type of mine.



SUBMARINES *(Pig Boats)*

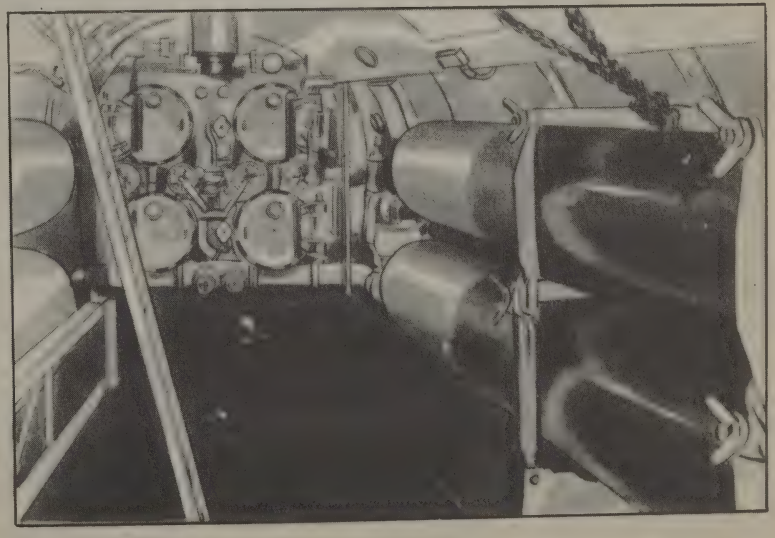
Submarines fall into three main types:

FLEET SUBMARINES. These are the fastest and most heavily armed. Designed for long-distance work, they stay at sea with the fleet. They usually carry two 5-inch guns, 8 torpedo tubes, and a seaplane, and can travel at a maximum speed of 17 miles per hour on the surface and 11 miles per hour submerged. They have a cruising range of 3,800 miles.

INSHORE SUBMARINES. These are small, easily handled, less speedy, and are generally used for defense along the coast. They carry a 4-inch gun and 8 torpedo tubes, have a maximum speed of 15 miles per hour on the surface and 9 miles per hour submerged. Their range is short, about 1,000 miles at best.

MINE LAYING SUBMARINES. These are generally of medium size, slow, but with good carrying capacity. They lay mines at the entrances of enemy harbors, in channels, and in the sea lanes usually followed by enemy vessels. Their speed is about the same as the inshore subs, but they are armored with only 4 torpedo tubes and a 4-inch gun.

They carry from ten to thirty contact mines. These mines are placed, one at a time, in an air lock toward the stern. This compartment is filled with water, and a trap door at the bottom is opened, allowing the mine to roll out. Then the trap is closed and the water is pumped out of the air lock.



The breeches of the torpedo tubes are shown at the right. An extra set of torpedoes is stored in the compartment ready to reload the tubes.

SONIC RECORDER *(Hydrophone)*

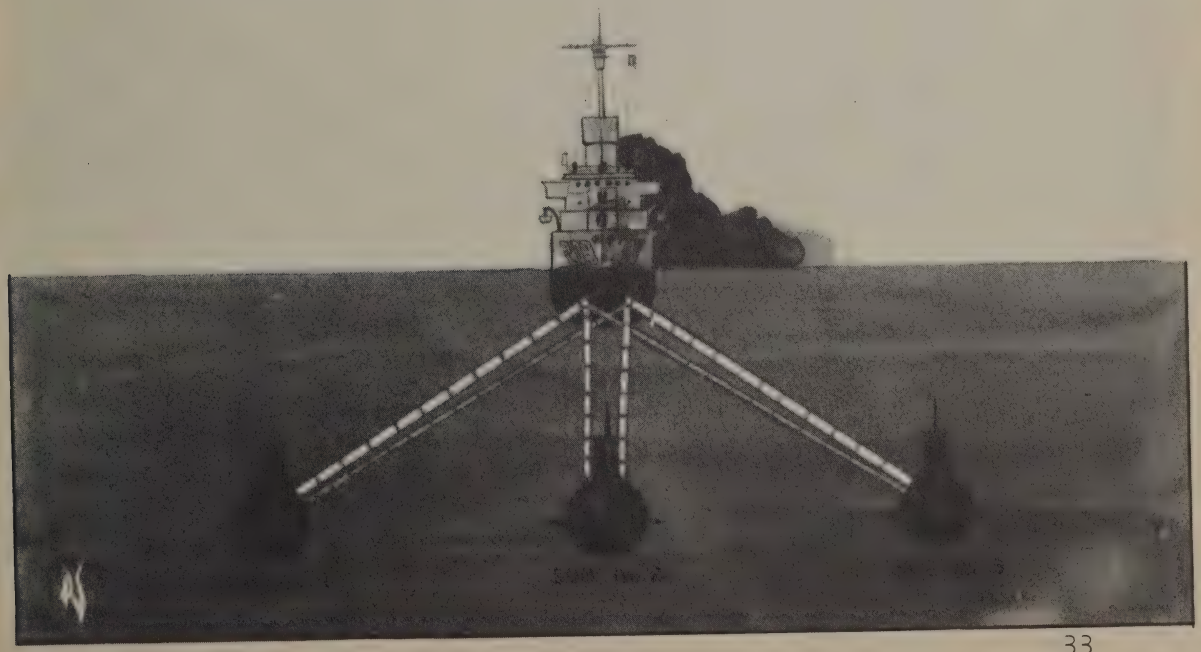
This is a device used by all men-of-war for locating the position of submerged submarines.

It consists of a pair of large microphones, one on each side of the bow below the water line. The operator wears a helmet to which the microphones are connected—the right hand "mike" to his right earphone, the left hand "mike" to his left earphone. Because he is highly trained, the operator is able to sort out the various sounds, distinguishing between extraneous noises and those made by his own vessel.

When he picks up the sound of a strange propeller with, say, his left ear, he reports it to the bridge through a telephone strapped on his chest. If no vessel can be seen on the surface the hunt is on.

The ship puts on full speed and is swung in the direction of the sound, the operator calling "right" or "left" depending on which ear receives the strongest sound. Thus the course is kept directly for the sub. When the sound has become equally loud in both ears, depth charges are dropped to explode at a predetermined depth in the water, and so destroy the submarine.

This illustrates the strength of the sounds in the operator's ears depending on the positions of the submarines.




424

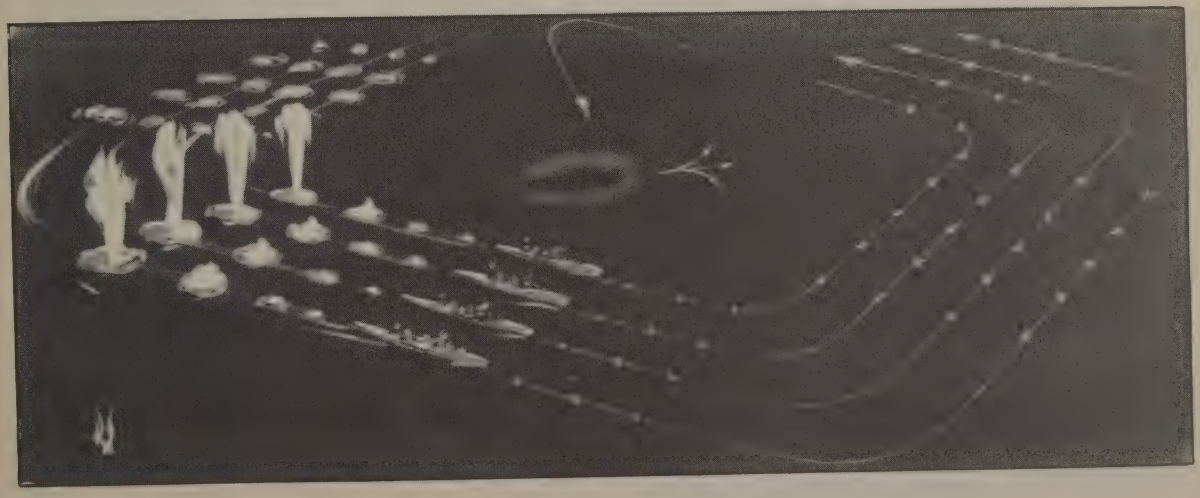
DEPTH CHARGES *(Ash Cans)*

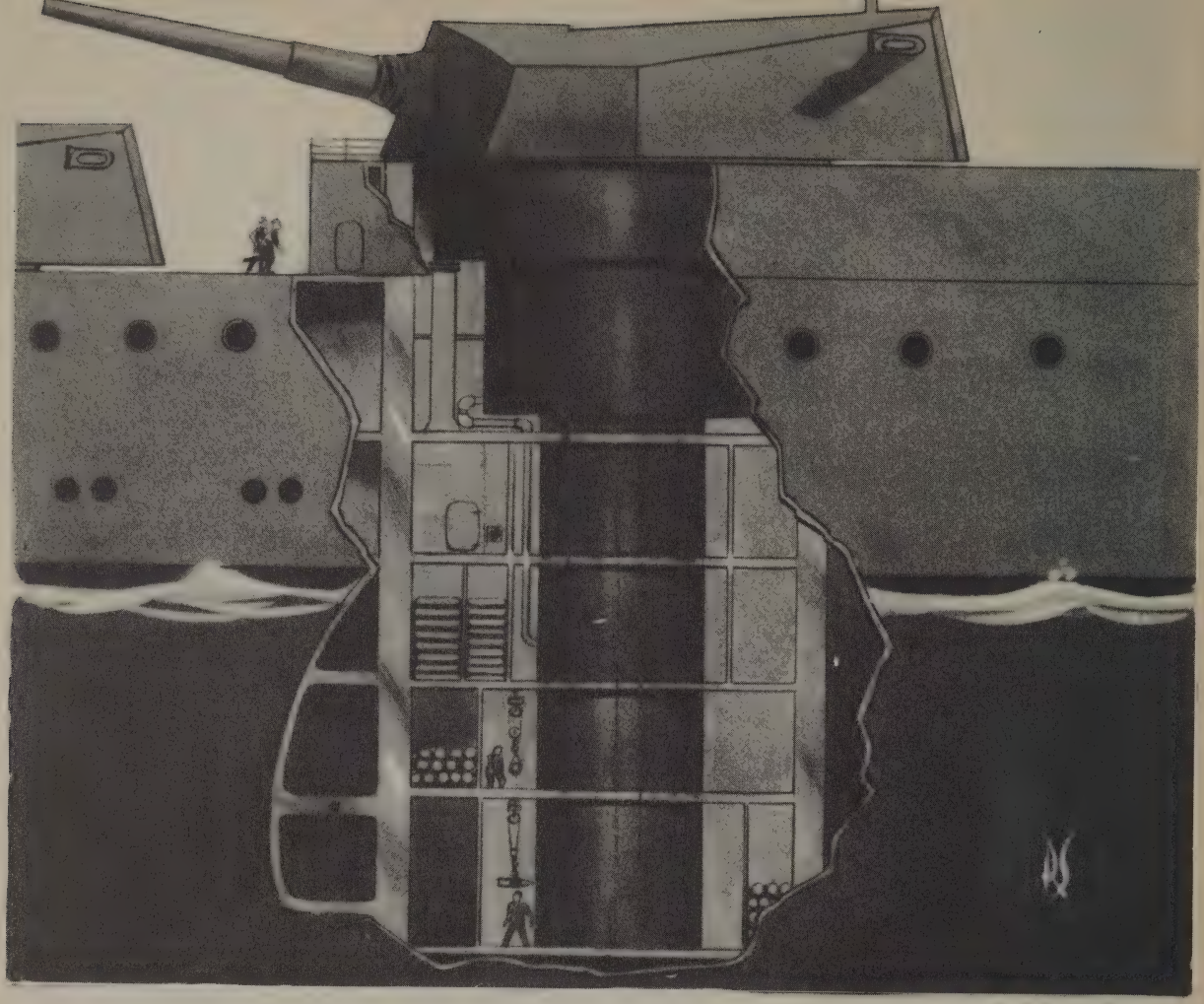
These are the Navy's chief weapon against submarines, and no defense from a properly placed depth charge has yet been devised.

The "ash can" is a simple steel container shaped exactly like the humble article from which its slang name is taken. Filled with from 150 to 300 pounds of TNT, and fitted with an adjustable firing valve which discharges it at any desired depth, the depth charge explodes with terrific detonations, damaging any underwater vessel in the vicinity. The explosion is so great that the result is generally fatal within a range of two hundred feet, and extremely dangerous at twice that distance.

Once a submarine has been located, the vessels designated to chase it travel in a set formation, dropping the charges as they go. The course is so laid out that it is almost impossible for the sub to escape, no matter what direction she takes or at what speed she travels.

The end of the chase is indicated by a heaving mass of bubbles and a great slick of oil on the surface of the water. However, occasionally the sub is able to come to the surface and set her crew overboard before she sinks.



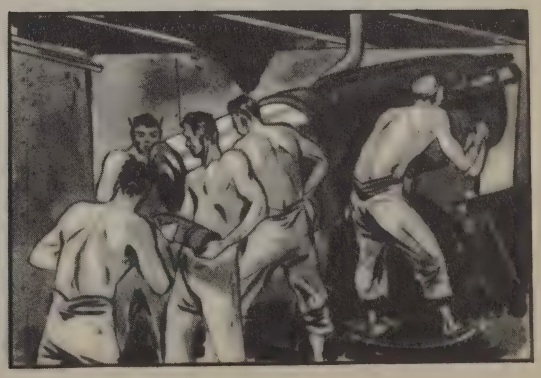


TURRET and BARBETTE

The turret which holds and protects the big guns on a war vessel is made of very thick armor plate on the roof as well as on the sides. This housing is mounted on a heavy, steel-armored tube which reaches from the turret itself to the bottom of the ship. This tube is known as the Barbette.

Aside from supporting the great weight of the guns and the turret, the tube forms protection for the instruments and machinery which turn the turret itself and operates the guns. In addition, it holds the ammunition hoist (the shaded portion of the barbette in the illustration) which conveys shells and powder bags to the gunners. This ammunition is kept in separate magazines and is fed to the hoist by the men in the magazines as rapidly as it is required in the turret.

The doors shown in the tube at each deck are essential, since the blast from a shell striking and exploding inside the turret could otherwise flash down the tube into the magazine below, and there blow up the whole ship. As an additional protection against this, there are light steel trap doors at each deck inside the hoist, so that a shell coming up to the guns pushes open the traps as it goes up, each trap slamming behind it after the shell has gone through.



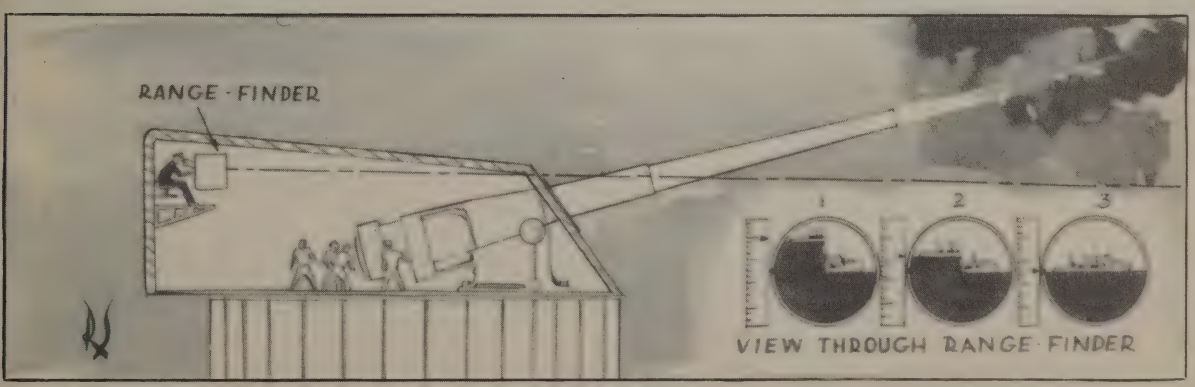

RANGE FINDER

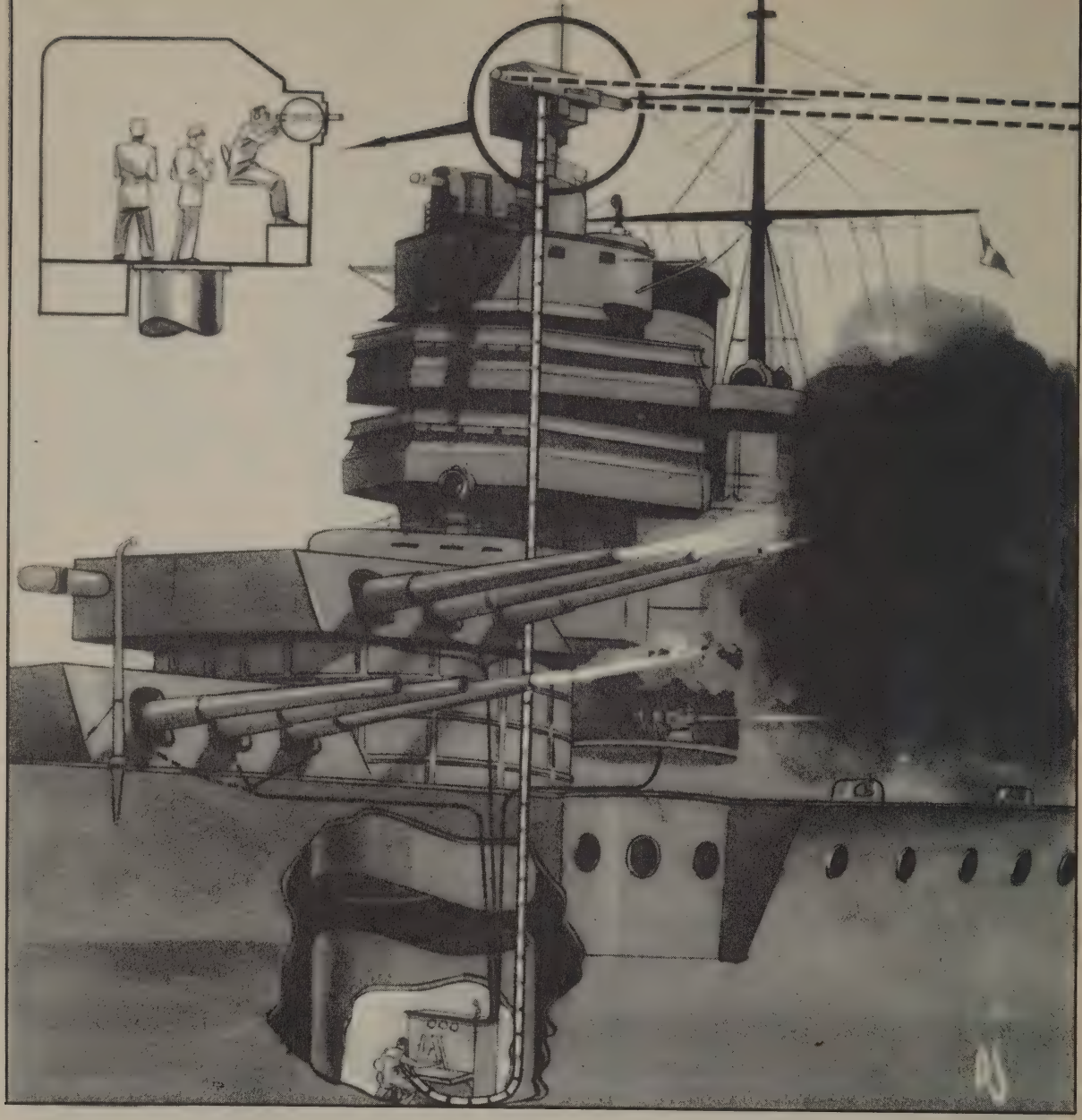
THE RANGE FINDER

The modern range finder is the most important of all gunnery instruments. Without it, the range has to be found by hit or miss methods, wasting many shots and losing valuable time. In these days, when encounters between ships seldom last more than half an hour, such a procedure would be disastrous.

The operation of the range finder is simple. The officer at the instrument looks through the eyepiece at the enemy vessel and sees it in two pieces. He then turns a small knob, gradually bringing the two images together. When the two images fit exactly, he looks at a scale beside the eyepiece and reads the exact range. (See sketch.)

The method used is trigonometrical triangulation, the range finder tube (which can be seen extending right across the back of the turret on the opposite page) forming the base of the triangle. The instrument makes its own calculation, and is simply a very large edition of the range finders used for camera work.





THE DIRECTOR

This is the mechanical brain of a warship's gunnery system.

The gunnery officer sits in the director tower at the top of the mast, watching the enemy ship through the eyepiece of his instrument. He calculates the speed and course of his target, keeping his telescope centered on it at all times. The director is connected with the big guns in the turret below. It automatically registers the findings on two dials at each gun. One dial shows the range and the other shows the angle, right or left. Each dial has two pointers—one of which is worked automatically by the director as the gunnery officer shifts his telescope. The other pointer is operated by the gunner who sets it to match the exact position of the director's pointers. Thus, by merely matching the pointers on each dial, the man behind the gun sets the exact range and angle. The gun is fired by the gunnery officer pulling a trigger in the tower.

The gunnery officer decides which guns he will use. He telephones the numbers of these guns to the transmitting station below the tower. In the transmitting station is a switchboard very like a telephone board; on this the operator plugs in only the guns which are called for. The gunnery officer pulls his trigger and all the guns which are plugged in on the switchboard fire together.

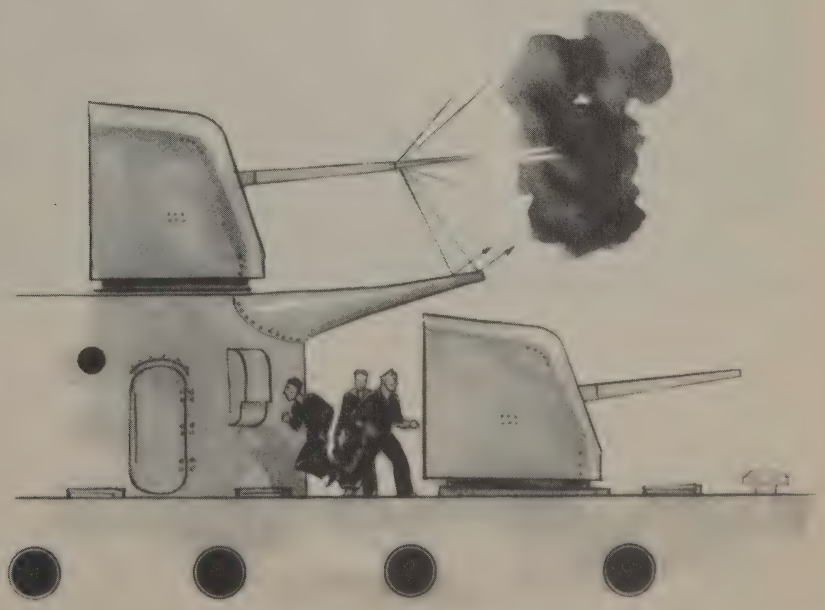
If the director is put out of action, the men in the turrets then replace it with their own expert eyes and judgment and finish the fight on that basis. However, in many cases the men in the gun turrets may fight an action without ever having seen the enemy, or without pulling a trigger themselves.

BLAST SCREENS

The force of the discharge of a gun is terrific. As the shell comes out of the muzzle it is followed by a mushroom of gas expanding at a tremendous rate. The action of this gas, pushing air before it in a growing circle, is known as "blast". Blast will snap off stout pieces of piping, tear up fittings, and endanger the lives of any men who come within its scope. For this reason, ships are fitted with blast screens of heavy steel construction where necessary to direct and disseminate the gas.

Nowadays, when anti-aircraft guns are located in every nook and cranny, the problem of screening is of considerable importance, even in large vessels where incidental gear is at a minimum and no men appear on deck in action. The effectiveness of the fire of the anti-aircraft guns would be considerably hampered if the gunners were forced to juggle them constantly in an effort to keep from blowing the tops off funnels, and men off the bridges.

The blast is almost instantaneous, so much so that, in the last war, a gunnery officer seated at an exposed range finder on a lower turret was blown off by the blast of a gun above him. He landed unhurt, minus his trousers, the friction of the cloth on the range finder seat being sufficient to keep them there.




SENDING STATION
67°
45°

RADIO DIRECTION FINDER

This is a device designed to give a vessel her position quickly without the necessity of working it out by lengthy navigational means. It also serves as a check for the navigator.

A number of sending stations along the coasts of the world send a single letter, in Morse code, steadily on certain wave lengths. Each station uses a different letter by which it is identified.

The navigator swings the ring, shown in the illustration, and picks up Station "A" (· — in code). He notes that when it comes in at its loudest, the ring is pointing 67° to the left of North. He then swings the ring around until he picks up Station "R" (· — · in code), and finds the ring pointing 45° to right of North.

Supposing "A" to be Norfolk and "R" to be Cobh in northern Ireland, the navigator draws a line on his chart from each of those stations at the angles shown by the ring. The point where the lines meet is his position.

Radio direction finding is accurate enough for general purposes, but is seldom used when close to shore owing to variations which the land sometimes causes in the radio waves.

The submarine shown is shelling an abandoned merchant vessel, and is getting her position in order to report to the nearest naval base.


3
2
1

MANEUVERS

A large fleet at sea is a delicate instrument to handle. If maneuvers are to be carried out without accident, the senior officer must know just how much space each vessel under his command requires in order to make a turn.

Most men-of-war turn on their bows. When the wheel is put over, the stern commences to swing around with increasing speed until the vessel is headed in the opposite direction. However, since a destroyer will turn in a very short distance, and a battleship requires almost two miles, it can be seen that a mixed fleet must be handled expertly.

The illustration shows the comparative turning circles of a destroyer, a cruiser and a battleship, under ideal conditions.

COMMUNICATIONS

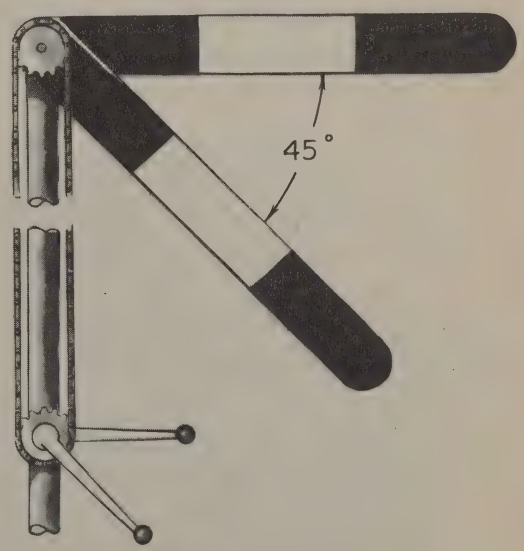
The heart of a fleet's operations lies in its ability to carry out its plans whether laid out well in advance, or made up on the spur of the moment. In order to accomplish this successfully, it is essential that all the vessels forming the fleet be able to communicate with one another in spite of wind, weather, and the enemy.

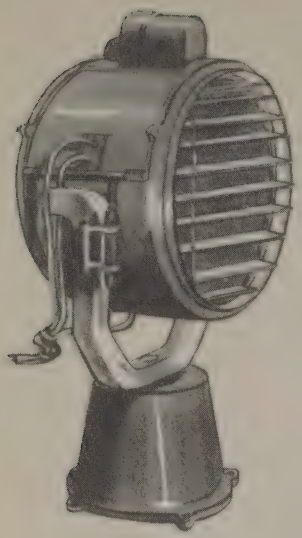
Instead of spelling out each word, all ships carry code books giving thousands of messages denoted by one, two, three, four and five letter groups. For example, the sending of the letters TOGG might mean, "Get up your anchor and follow at full speed," and so on for all likely requirements.

Radiotelephone and the radio dot-and-dash system are used, in code of course, but in action the air is filled with artificial static, sent out to make these well-nigh useless. Other means then come into play.

FLAGS. Varicolored flags of different designs are used to designate the various letters of the alphabet. These are run up the mast, and are quick and certain under favorable conditions.

THE SEMAPHORE. Twenty-six different positions of these two arms represent the twenty-six different letters of the alphabet. Each code word is spelled out one letter at a time. This is a very fast, effective method but cannot be used over great distances. For shorter distances, small flags in the signalman's hands are used in the same way.

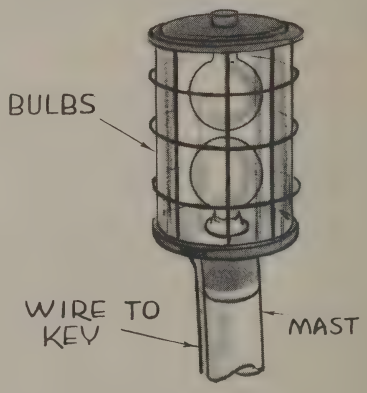


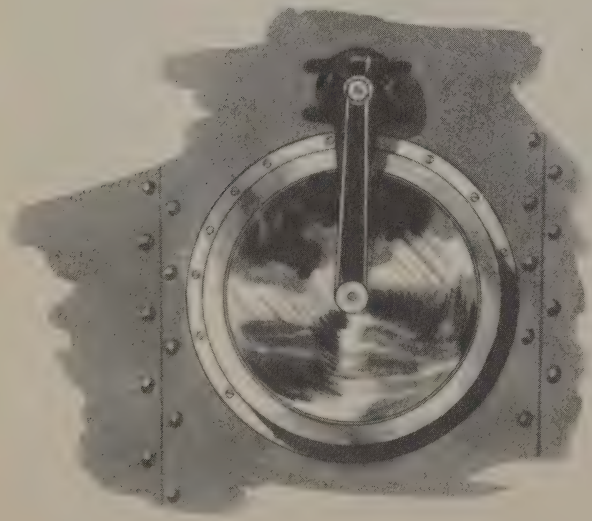


THE SEARCHLIGHT. The shutter over the light is mechanically operated so that it opens and shuts at the slightest pressure of the operator's key. Dashes and dots are sent with it in the same manner as telegraph messages are sent on shore. In the daytime, the light can be seen, under favorable circumstances, at a distance of ten miles. At night, the beam is directed upwards, which vastly increases the distance at which it can be read.

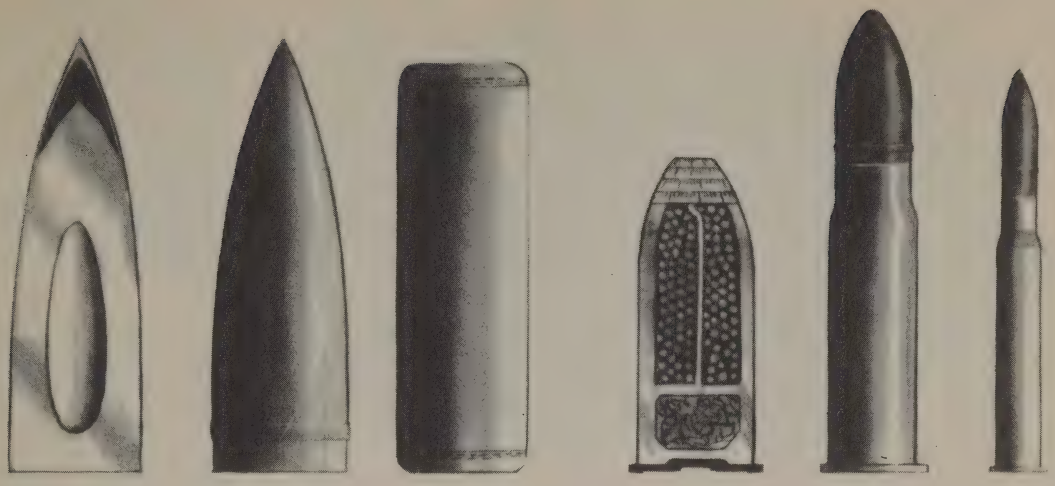
MASTHEAD BLINKER. This as a small light on top of the mast, operated by a key in the same manner as a hand searchlight. It is used for short-distance and harbor work at night.

After some practice a signalman learns to read a flashing lamp much as he would read a book. He reads the words rather than the individual letters. For this reason, a lamp message can be easily read as fast as it is possible to send it.





Visibility for receiving messages is maintained during heavy rain or freezing weather by means of the device shown at the left. This is a spinning piece of glass, inserted in a porthole which turns at a tremendous speed, so that the water is thrown off at the edges before it can blur the glass or freeze upon it.



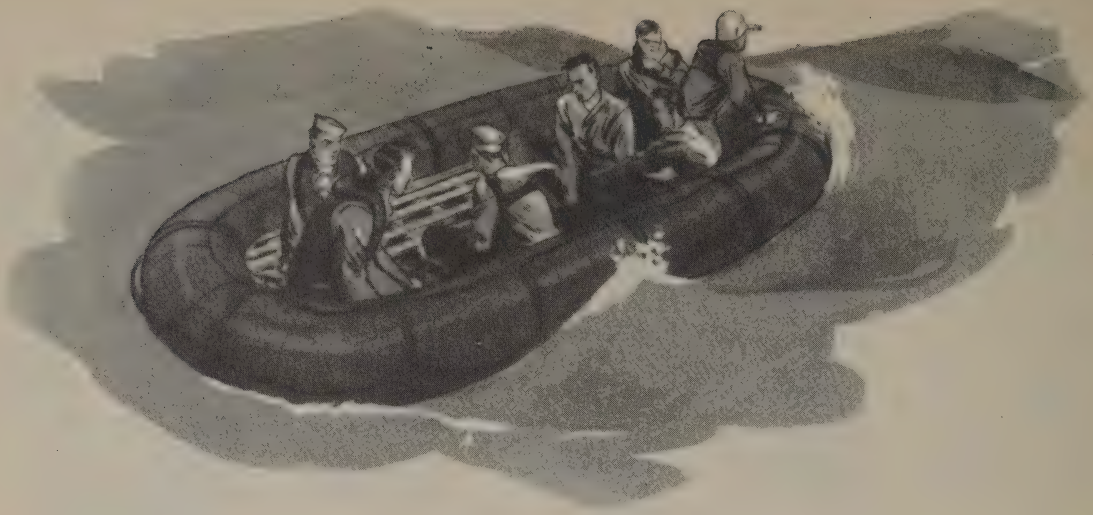
AMMUNITION

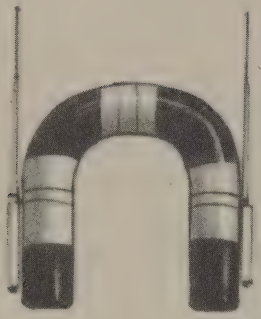
The principal ammunition of a warship is the armor-piercing shell. This is designed to punch through the armor of many vessels and then explode inside the hull. This shell has a wrought iron cap which melts on impact, setting off the fuse and acting as a lubricant for the shell driving in behind it. A section through the shell and its cap is illustrated on the left (A).

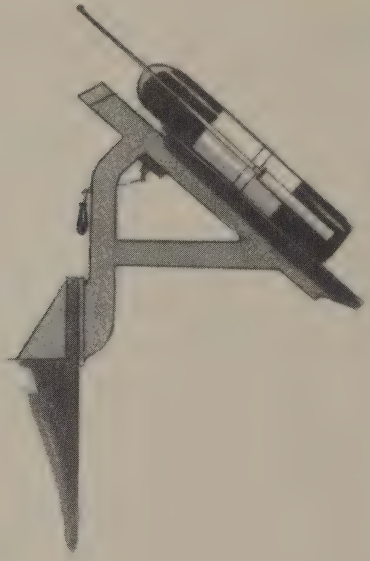
In almost all ammunition above 4-inch caliber, the shell and the charge which fire it are separate. The charge is packed in silk bags of various sizes, and as many bags as necessary are put into the breech for each shot. The big shells, weighing as much as a ton, require a very large charge to fire them. An outside view of a large shell and its powder bag is shown (B and C).

The next shell pictured (D) is shrapnel. This consists of a steel container which is filled with both lead bullets and a bursting charge. The fuses are set so that the shell will burst over the enemy's decks, generally to clear out anti-aircraft gunners. Shrapnel is also used to protect landing parties and against troops on shore.

The two shells on the right (E and F) are a 4-inch and a 37-mm, respectively. Each shows the brass cartridge case attached. These are used mainly against aircraft and destroyers, and can have a solid, armor-piercing projectile or an explosive one which explodes on contact.







FLOAT and LIFE BUOY

When a warship goes into action, all her boats, wooden furniture, etc., are thrown overboard (jettisoned); otherwise they would constitute a great fire hazard, besides being a source of flying splinters.

The only remaining pieces of life-saving apparatus are the "floats". These are oval tubes of aluminum or thin steel, divided into watertight compartments. Each tube has a slat floor in the center. The floats vary in size but the one shown is in most general use. This will support twenty men in safety if not in comfort.

At the stern of every warship is the life buoy. Horseshoe-shaped and made of copper or aluminum, it is mounted on slides and released by a trigger. The cylinders on either side contain chemicals, one making smoke and the other a flare. At the first cry of "Man overboard", the nearest man rushes to the frame and pulls the trigger. The buoy drops into the water and the smoke and flare are automatically released, so that the swimmer will be guided to the buoy and, eventually, the ship's boats to the swimmer. The cylinders hang down into the water and the smoke and flare come out of the tops of the long tubes, well above the swimmer's head.

THE MARINES

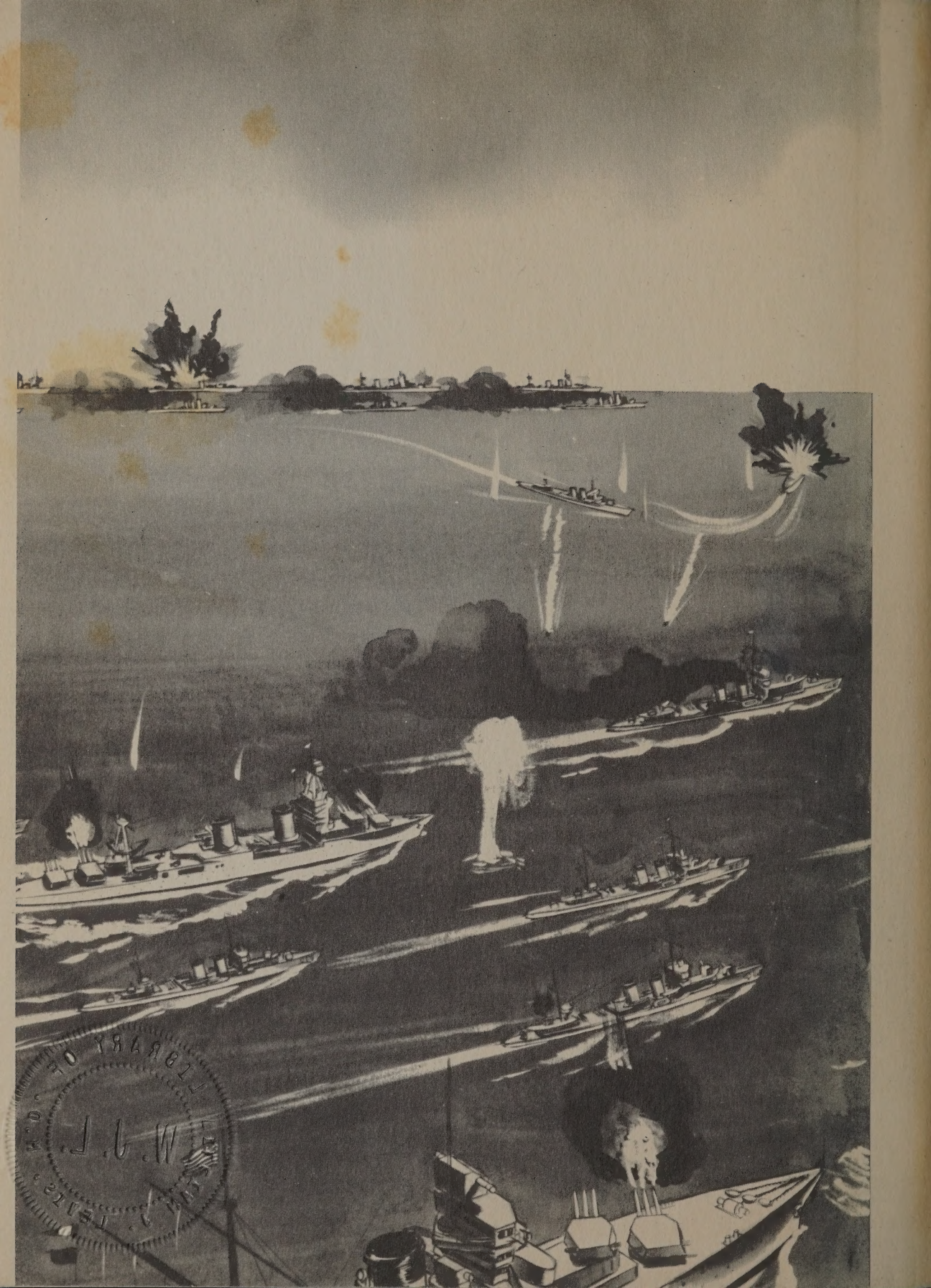
Although the United States Marines operate under the Navy Department, they are trained, equipped and used as soldiers and, therefore, have been aptly named "the soldiers of the sea".

Most of their work is carried out on shore in faraway places, where they protect our property and interests.

In times of emergency, the Marines are transported by the various naval units to the scene of action. Supported by all the

arms of the fleet, they force a landing and give battle. Thus they are the vanguards of our offensive strategy.

The illustration shows the Marines in action. Dive bombing planes have first been released from aircraft carriers to blast the enemy positions near shore. These circle and swoop, using their machine guns to protect the Marines who are landing in boats and amphibian tanks. Heavy tanks, artillery and armored cars are brought ashore on floats. The ships use their big guns to lay down a barrage in front of the attacking marines.



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